

WHAT IS CLAIMED IS:

- 1 1. A method usable in an active router to route received packets,
2 said method comprising the steps of:
3 associating threads with received packets for processing the received
4 packets; and
5 while processing a previously received packet,
6 checking for the arrival of an interrupt;
7 creating a thread for associating said interrupt;
8 determining whether the thread associated with the interrupt has a
9 priority that is higher than the priority of a thread associated with said previously
10 received packet;
11 if the thread associated with the interrupt has a higher priority than
12 said previously received packet, saving the thread associated with the previously
13 received packet in a Shared Arena storage area;
14 if the thread associated with the interrupt does not have a higher
15 priority than said previously received packet, queuing the thread associated with
16 the interrupt.
- 1 2. The method according to claim 1, wherein the interrupt is an
2 event indicating the arrival of a packet or expiration of a timer.
- 1 3. The method according to claim 1, wherein a thread is
2 associated with each received packet or a group of received packets.
- 1 4. The method according to claim 1 further comprising a step of
2 processing said thread associated with the interrupt, wherein the Shared Arena is
3 accessible during said step of processing a previously received packet, said step of
4 determining whether the thread associated with the interrupt has a priority that is
5 higher than the priority of a thread associated with said previously received packet,
6 and said step of processing said thread associated with the interrupt.

1 5. The method according to claim 1, wherein the thread
2 associated with the previously received packet saved in the Shared Arena is
3 preempted by the interrupt having a higher priority, and the processing of the
4 received packet is suspended in the Shared Arena.

1 6. The method according to claim 1 further comprising the step
2 of processing the interrupt.

1 7. The method according to claim 6, wherein during said step of
2 processing of the interrupt, further interrupts of lower or equal priority are
3 disabled.

1 8. The method according to claim 6, wherein when said step of
2 processing of the interrupt has ended, the method further comprises the steps of:
3 determining whether there is a pending interrupt or thread having a
4 higher priority than the thread saved in the Shared Arena;

5 if there is a pending interrupt or thread having a higher priority than
6 the thread saved in the Shared Arena, processing the next interrupt or thread; and,

7 if there is no next interrupt or thread having a higher priority,
8 resuming the processing of the thread associated with the previously received
9 packet saved in the Shared Arena.

1 9. The method according to claim 8, wherein prior to resuming
2 the processing of the thread, the method further comprises the step of setting an
3 identifier of a currently running thread.

1 10. The method according to claim 1, wherein said step of
2 associating threads with received packets further comprises the step of enqueueing
3 said threads to a nonblocking priority run queue accessible for parallel access.

1 11. The method according to claim 10, wherein said run queue
2 includes an age value and a pointer that are updated with an operation to either add
3 or remove a thread from said run queue, and said age value is used only to ensure
4 one parallel operation at a time and a pointer indicating either an adding or
5 removing of a thread.

1 12. The method according to claim 10, wherein said run queue is
2 an array of nonblocking Last-In-First-Out ("LIFO") or First-In-First-Out ("FIFO")
3 data structures.

1 13. A system usable in an active router to route received packets
2 comprising of:

3 a packet priority level process scheduling said threads and
4 processing and routing the packets according to their priority;

5 an interrupt priority handling process for handling an interrupt and
6 associating threads with received packets and scheduling said packets during a
7 processing of a previously received packet associated to a thread; and,

8 a Shared Arena for storing the thread associated with the previously
9 received packet before the processing of the interrupt;

10 wherein said Shared Arena is a communication mechanism between
11 said packet priority level packet process and said interrupt priority handling
12 process.

1 14. The system as defined in claim 13 further comprising a
2 nonblocking priority run queue accessible for parallel access.

1 15. The system as defined in claim 13, wherein the thread saved
2 in the Shared Arena is suspended until the processing of the interrupt has ended.

1 16. The system as defined in claim 13, wherein the thread saved
2 in the Shared Arena may be resumed when returning to packet priority level
3 processing.

1 17. The system as defined in claim 16 further comprising a
2 plurality of processors, and the interrupt is processed on one processor and the
3 resumed thread is processed on another processor.

1 18. A router for routing received packets, said router comprising
2 a set of instructions to:

3 associating threads with received packets for processing the received
4 packets; and

5 while processing a previously received packet,
6 checking for the arrival of an interrupt;
7 creating a thread for associating said interrupt;
8 determining whether the thread associated with the interrupt has a
9 priority that is higher than the priority of a thread associated with said previously
10 received packet;
11 if the thread associated with the interrupt has a higher priority than
12 said previously received packet, saving the thread associated with the previously
13 received packet in a Shared Arena storage area;
14 if the thread associated with the interrupt does not have a higher
15 priority than said previously received packet, queuing the thread associated with
16 the interrupt.